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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/504,022	02/18/2000	Richard S. Szeliski	MCS-093-99	9342
27662	7590	07/14/2005	EXAMINER	
LYON & HARR, LLP 300 ESPLANADE DRIVE, SUITE 800 OXNARD, CA 93036				EDWARDS, PATRICK L
		ART UNIT		PAPER NUMBER
				2621

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/504,022	SZELISKI ET AL.	
	Examiner	Art Unit	
	Patrick L. Edwards	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 21 March 2005.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-10, 12-17, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 9, 10, 12-17, 19 and 20 is/are allowed.
- 6) Claim(s) 1-8 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The response received on 21 March 2005 has been placed in the file and was considered by the examiner. An action on the merits follows.

Response to Arguments

2. The arguments filed on 21 March 2005 have been fully considered. A response to these arguments is provided below.

35 USC § 132 – New Matter Objection**Procedural Posture:**

In the non-final office action mailed on 05 May 2004, the substitute specification was objected to under 35 USC § 132 for introducing new matter into the disclosure. Specifically, four new matter objections (A, B, C, D) were made. Three of these objections (A, B, and D) were maintained in the next office action mailed on 12 January 2005. Applicant traverses these objections.

Summary of Argument:

1. The following excerpt from page 13, lines 11-15 of the substitute specification is objected to as being new matter
“during a raster transformation of the first or second sets of digital data, multiple images of the digital data are placed in texture memory as multiple textures. Then, statistics are gathered concerning the textures, and the raster transformed sets of digital data are compared and matched against corresponding portions of each other”

Applicant advances the following arguments in response to the prior objection:

A) Applicant argues that there is support in the original disclosure for the storing of both “images” and “templates” in a texture memory. Applicant argues that “a portion of an image is still an image,” and that “pieces of the original image do not magically cease to be images simply because they are only portions of the photograph.” (remarks pg. 10)

B) Applicant has amended “first and second” to read “first or second.” Applicant argues that this fully addresses the concern raised in the previous office action that there was no support in the original specification for the transformation of both of these sets of data (remarks, pg. 11).

C) Applicant alleges that images can be stored in texture memory. In support of this argument, applicant states that “templates are images” and that “Applicant’s do not believe that this point should be at issue.” (remarks pg. 11). Further, applicant argues that examiner has confused the art-accepted definition of the word “texture.” (remarks, pg. 12).

D) See part (C) above.

E) Applicant argues that the term “texture” has been misinterpreted by the examiner and that—given the new definition of “texture” provided in applicant’s remarks—the templates that are stored to texture memory are images (remarks pg. 13)

Art Unit: 2621

2. Applicant argues that the statement “instead of rasterizing the texture into the frame buffer, certain statistics can be recorded for normalized correlaton or other statistics can be recorded for variations” fully supports “gathering statistics between textures.”
3. Applicant has deleted the objected to text, and argues that this amendment has overcome the objection.

Examiner’s Response:

1. The amendment to the specification and the corresponding arguments are found to be persuasive. Applicant has defined the term “texture” differently than the examiner’s previous interpretation. This clarification of terms—along with the amendment to the passage in question—clears up the lingering new matter issues. The examiner would like to make note that there are two art-accepted definitions for the term “texture”; both of which will be provided as an attachment to this office action. However, since applicant has clearly stated which definition should be employed in the instant action, the interpretation of this term is no longer at issue.
2. Applicant’s argument has been fully considered and is considered persuasive. The objection is withdrawn.
3. The examiner agrees, and appreciates applicant’s efforts in advancing prosecution.

Prior Art Rejections

Summary of Argument:

1. Applicant traverses the rejection of claim 6 under 35 USC 102b as being anticipated by Sacks et al. (USPN 4,736,437). Applicant argues that Sacks fails to teach, suggest, or disclose the claimed features of “rendering model transformations” and/or “adjusting model transformation”. Applicant further argues that Sacks teaches away from performing such transformations (applicant’s remarks, pg. 16-19).
2. Applicant traverses the rejection of claims 1-5 under 35 USC 103, and argues that the combination of Sacks and Segal fails to disclose all of the limitations of the amended claim 1 (see applicant’s remarks pg. 20-21). More specifically, applicant argues that the combination fails to teach, suggest, or disclose combinations of various transforms including combinations of rotations, scales, perspective transforms, and translations.
3. Applicant traverses the rejection of claim 9 under 35 USC 103, and argues that the cited combination does not teach the limitation of “using alpha values to weight statistics.” Further, applicant argues that the cited combination does not teach the newly added claim limitations of combinations of various transforms, including, for example, various combinations of raster transformations including combinations of rotations, scales, perspective transforms, and translations.

Examiner’s Response:

1. Applicant’s arguments have been fully considered but are not persuasive. Applicant relies on the fact that the image rotation in Sacks is accomplished by reading out the data in memory along a scan direction that is offset by an angle theta from the original information. An image transformation is well known in the art as an algorithm that takes an image, alters it, and outputs a new image. The Sacks reference, therefore, discloses an image transformation. The examiner is aware that the rotation disclosed in Sacks is not performed in a manner identical to the instant invention. This is inconsequential. Applicant is reminded that limitations from the specification are not

Art Unit: 2621

read into the claims, and that claims are to be given their broadest reasonable interpretation (see MPEP §§ 2111, and 2145).

2. Applicant's arguments have been fully considered but are not persuasive. The arguments are directed to a limitation that has not been previously presented or discussed.
3. Applicant's arguments have been fully considered and are persuasive. The rejection to claim 9 is withdrawn.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being anticipated by Sacks et al. (U.S. Patent No. 4,736,437 A) in view of Cipolla (USPN 5,581,276)

As applied to claim 6, Sacks et al. discloses a method for comparing and matching a first set of digital data to at least a second set of digital data, comprising: loading at least one of the first and second sets of digital data into a first memory device (see Fig. 1: Digital data is loaded into reference memory 16.).

Sacks discloses using a 3D rendering device for rendering model transformations and accumulating statistics of the loaded digital data, said 3D graphics rendering device modified to include a statistical processor (see Fig. 3 and column 10, line 61 – column 11, line 13: The reference describes that the angle rotator initially rotates the scanning line of the information stored in the reference memory 16 (i.e. rendering model transformations). This information is then convolved with the information in the video memory 20 and these values are accumulated by accumulator 24 (i.e. accumulating statistics). Convolver 22 is equivalent to the claimed statistical processor. (Note: The specification describes that a 3D rendering device is equivalent to a graphics rasterizer. Therefore, the overall system is a graphics rendering device.)).

Sacks discloses adjusting the model transformations based on the accumulated statistics (see Fig. 1: The accumulator 24, which accumulates the results from the convolver 22, sends information (i.e. accumulated statistics) to the CPU 10. The CPU 10 then uses this information to adjust the angle of rotation used by the rotator 18 to rotate the reference image (i.e. model transformation).)

Sacks discloses statistically comparing and matching the model transformations of the loaded set of digital data to appropriately corresponding portions of the other set of digital data (see Fig. 1: The data is statistically compared and matched by the convolver 22).

As applied to claim 7, Sacks et al. discloses statistically comparing the sets of digital data until a match or non-match between the first and second sets of data is achieved (see column 8, lines 23-29: The reference describes

accumulating information (i.e. statistically comparing) until the CPU 10 determines a best match (i.e. until a match or non-match between the first and second sets of data is achieved).).

As applied to claim 8, Sacks et al. discloses adjusting the models comprises analyzing the statistical comparisons and generating new transformations for matching the sets of data (see Fig. 1: The results of the convolution (i.e. computed statistics) are accumulated by accumulator 24 and then sent to CPU 10 where the results are analyzed. The CPU then sends information to rotator 18 so that different transformations can be performed on the reference image.).

As further applied to claim 6, Sacks discloses transforms such as a rotation operation and a perspective transformation (Sacks col. 11 lines 25-40), but fails to expressly disclose that the transformation includes combinations of rotations, scales, perspective transforms and translations. Cipolla, however, discloses a 3-D affine transformation operation which encompasses all of the claimed transformation methods (Cipolla col. 21 lines 6-22). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify the transformation of Sacks by employing an affine transformation as taught by Cipolla. Such a modification would have allowed for the robust operability and flexibility of the affine transform operation in performing image transformations.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Sacks et al. (U.S. Patent No. 4,736,437 A), Cipolla (USPN 5,581,276), Segal et al. (the book titled “The OpenGL® Graphics System: A Specification (Version 1.2.1)”), and further in combination with well-known prior art. The arguments as to the relevance of the combination of Sacks and Cipolla as applied above are incorporated herein.

As applied to claim 1, the applicant describes that the system can be embodied in a conventional computer graphics card that has been modified to include the statistical comparison processor (see applicant’s specification: page 4, lines 26-27). Therefore, it is well known in the prior art to use a computer graphics card for raster transforming at least one of the first set of digital data and the second set of digital data and performing a pixel acceptance test using a pixel acceptance tester. However, it is not well known in the prior art to a) perform a statistical comparison between part of each of the first set for digital data and the second set of digital data, wherein the statistical comparison includes statistically comparing and matching the raster transformed sets of digital data to

appropriately corresponding portions of each other and b) to include the statistical processor in the computer graphics card.

Regarding difference b), Segal et al. discloses a graphics card with an included statistics processor (see page 234, section D.9.4: The reference describes a software interface to graphics hardware that allows for the accumulation of statistical information regarding pixels (i.e. statistics processor).).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the well known graphics card by adding a statistics processor as taught in Segal et al. because the use of such a configuration would decrease the size and the cost of the system, thus increasing overall efficiency.

Regarding difference a), Sacks et al., in the same field of endeavor of image processing, discloses performing a statistical comparison between part of each of the first set for digital data and the second set of digital data using a statistical processor, wherein this comparison includes statistically comparing and matching the raster transformed sets of digital data to appropriately corresponding portions of each other (see Figs. 1, 3, and column 10, line 61 – column 11, line 13: The reference describes that an angle rotator initially rotates the scanning line of the information stored in the reference memory 16 (i.e. raster transformed information). This information is then convolved with the information in the video memory 20 and these values are accumulated by accumulator 24 (i.e. accumulating statistics). This data is then statistically compared and matched by the convolver 22.).

As applied to claim 2, Sacks et al. discloses analyzing the statistical comparisons and generating new transformations for matching the sets of data (see Fig. 1: The statistical comparisons are analyzed by the CPU 10 and then new transformations are generated by the rotator 18.).

As applied to claim 3, Sacks et al. discloses statistically comparing the raster transformed sets of digital data until a match or non-match between the first and second sets of data is achieved (see column 8, lines 23-29: The reference describes accumulating information (i.e. statistically comparing) until the CPU 10 determines a best match (i.e. until a match or non-match between the first and second sets of data is achieved).).

As applied to claim 4, Sacks et al. discloses raster transforming comprises raster transforming at least one of the first or the second set of digital data and computing statistics on the transformation (see Fig. 1: The raster transform in Sacks comprises rotating the reference image and then convolving it with the video image (i.e. computing statistics). This process is then repeated and the results of the convolution are accumulated by accumulator 24.).

As applied to claim 5, Sacks et al. discloses that statistically comparing and matching comprises analyzing the computed statistics of the transformation and calculating new and different transformations on the digital data (see Fig. 1: The results of the convolution (i.e. computed statistics) are accumulated by accumulator 24 and then sent to CPU 10 where the results are analyzed. The CPU then sends information to rotator 18 so that different transformations can be performed on the reference image.).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of the conventional graphics card and statistics processor taught by Segal et al. by adding the specific processing steps taught in Sacks et al. because the use of such processing steps allows the system to operate

Art Unit: 2621

"with a minimal amount of memory" and to "implement all procedures in fast real time hardware" (see Sacks et al.: column 5, lines 27-29).

Allowable Subject Matter

7. Claims 9-10, 12-17, 19, and 20 are allowed.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick L Edwards whose telephone number is (571) 272-7390. The examiner can normally be reached on 8:30am - 5:00pm M-F.

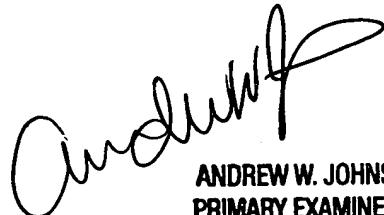
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joe Mancuso can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick L Edwards

Art Unit 2621

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ANDREW W. JOHNS
PRIMARY EXAMINER